2018 AND BEYOND POTENTIAL STUDY

LOW INCOME SECTOR ANALYSIS

APRIL 28, 2017

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TABLE OF CONTENTS

SECTION 1: Introduction and Overview
SECTION 2: Overview of model methodology
SECTION 3: Review of literature and research
SECTION 4: 2018 Inputs and Preliminary results
SECTION 5: Next Steps and Closing

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TABLE OF CONTENTS

SECTION 1: **Introduction and Overview**
SECTION 2: **Overview of model methodology**
SECTION 3: **Review of literature and research**
SECTION 4: **2018 Inputs and Preliminary results**
SECTION 5: **Next Steps and Closing**

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SECTION 1: INTRODUCTION AND OVERVIEW

- Scope of Activity
  - Update market potential for low income (LI) segment using same general approach as previous CPUC potential and goals (PG) models
  - Review new literature and research to define new inputs accounting for policy changes where data allows
  - Forecast market achievable potential (no forecast of technical or economic potential)
  - Identify areas of future research

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TABLE OF CONTENTS

SECTION 1: Introduction and Overview
SECTION 2: Overview of model methodology
SECTION 3: Review of literature and research
SECTION 4: 2018 Inputs and Preliminary results
SECTION 5: Next Steps and Closing

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SECTION 2: OVERVIEW OF MODEL METHODOLOGY

- Same general equation as 2015 Model
- Market Savings Potential = Annual Households (HH) Treated x Unit Energy Savings (UES)
  - HH Treated
    - Number of customers forecast to be treated
    - New for 2018 model
      - Includes separate HH forecast for first time participants and retreatments where data is provided by the IOUs
      - Includes separate HH forecast for single family (SF) and multi-family (MF)
  - UES
    - UES value is total HH savings (kW, kWh, Therms)
    - New for 2018 model
      - Includes separate UES value for first time participants and retreatments where data is provided by the IOUs
      - Includes separate UES values for SF and MF households where data is provided by the IOUs

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SECTION 2: OVERVIEW OF MODEL METHODOLOGY

- Program Cost = Forecast Households Treated x Average Cost per HH Treated
  - Average Cost per HH Treated = Total Number of Households Treated (for the period reviewed) / Total Expenses (excluding accruals)
  - HH treated and total expenses data from ESAP Annual report or EESTAT Monthly

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TABLE OF CONTENTS

SECTION 1: Introduction and Overview
SECTION 2: Overview of model methodology
SECTION 3: Review of literature and research
SECTION 4: 2018 Inputs and Preliminary results
SECTION 5: Next Steps and Closing

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SECTION 3: REVIEW OF LITERATURE AND RESEARCH

Data and literature sources were reviewed to assess how UES and HH values in the model might be updated. Sources reviewed since the 2015 PG update include:

- Decision 16.11.022, November 10, 2016
- Needs Assessment for the Energy Savings Assistance and the California Alternate Rates for Energy Programs, December 15, 2016
- Various ESAP Monthly reports, cumulative for 2016
- Compliance Filing of IOU Regarding Annual Estimates of CARE Eligible Customer and Related Information, February 11, 2016 ('Athens' report)
- IOU data request
  - Provide forecast of 1st time treatments for 2017-2020, broken out by SF and MF
  - Provide forecast of retreatment HHs by year beginning in 2017 through 2030
  - Separate UES values for SF and MF, including separate 1st time treatment and retreatment UES values for each segment.
- Other Literature
  - Various Senate Bill 535 information and maps
  - NRDC multifamily preliminary data

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IOU data request

- Utilities provided different forecast horizons and levels of UES and HH granularity

Utility	Varied UES by Year	Provided UES by Housing Type			Provided UES by Treatment Type		
		SF	MF	MH	Single Value	First Time	Retreatment
PG&E	x	x	x	x		x	x
SCE	x	x	x		x		
SDG&E	x	x	x		x		
SCG		x	x	x		x	x

Source: Navigant analysis

Utility	HH Forecast Extends Past 2020	Provided HH by Housing Type			Provided HH by Treatment Type		
		SF	MF	MH	Single Value	First Time	Retreatment
PG&E		x	x	x		x	x
SCE		x	x		x		
SDG&E		x	x			x	x
SCG	x	x	x	x		x	x

Source: Navigant analysis

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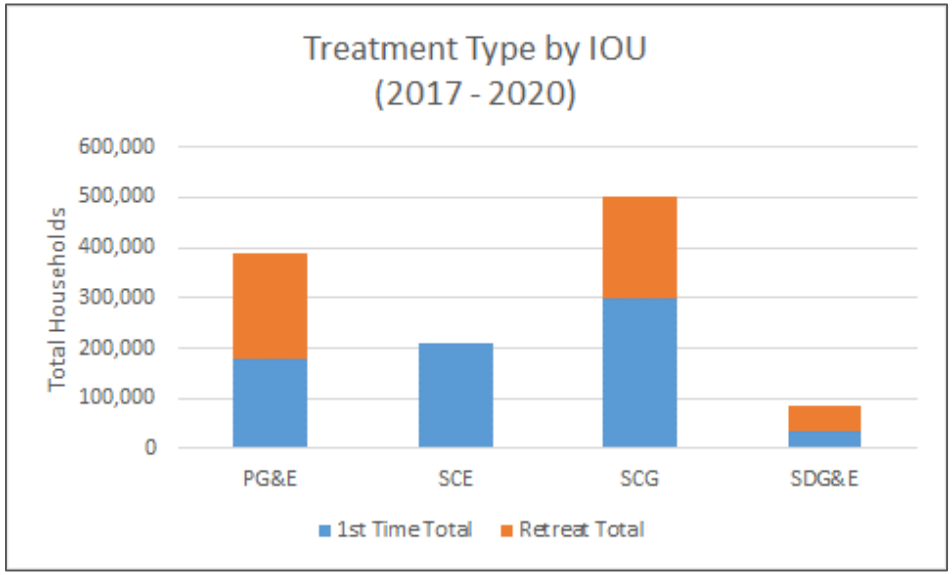
SECTION 3: REVIEW OF LITERATURE AND RESEARCH

HH Inputs – Retreatments

- Decision 16.11.022 ordering paragraph 9 eliminates the Go-Back rule
  - IOU data request indicates 39% of all IOU forecast HH are retreatments
  - SCE does not forecast retreatments
  - Only SCG forecasts retreatments past 2020, providing a forecast out to 2030
- Retreatments increased the forecast in total HH treated compared to the 2015 PG Study



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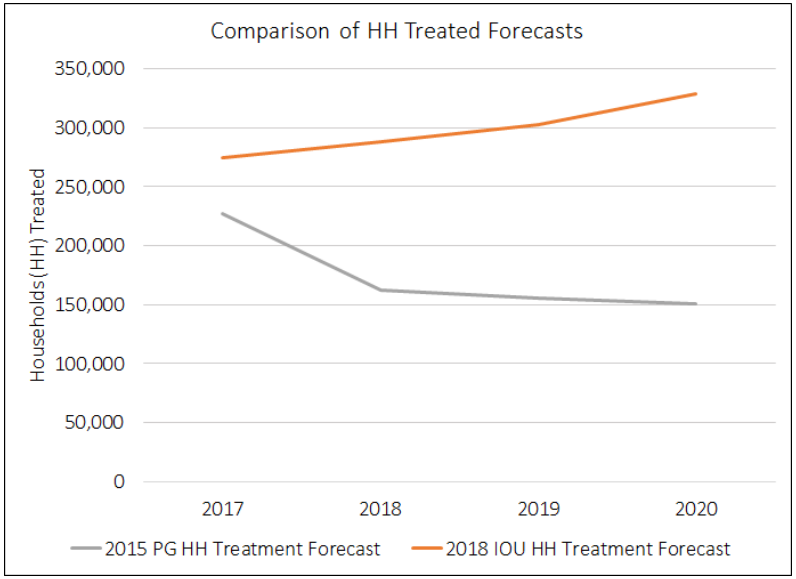

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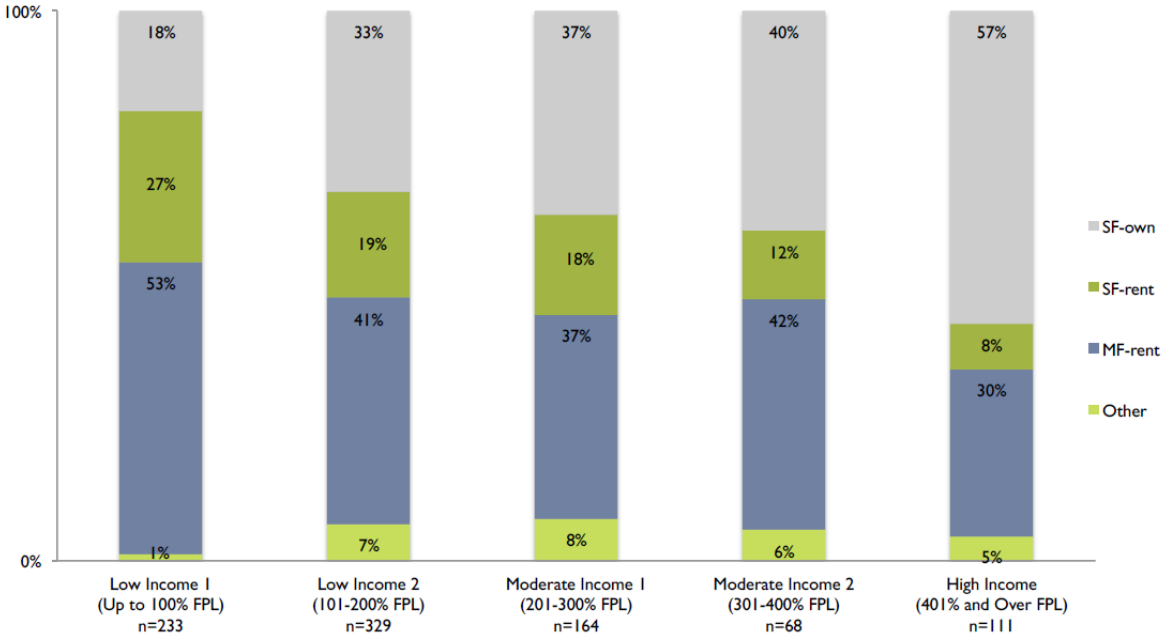
SECTION 3: REVIEW OF LITERATURE AND RESEARCH

HH Inputs – MF market observations

- 2016 LINA indicates approximately 50% of LI market is MF renter
- IOU forecasts approximately 26% of forecast HH treatments are MF
- NRDC provided preliminary information on forthcoming economic potential model for MF market



Source: 2016 LINA, Figure 2

Utility	Total HH	MF HH	% MF
PG&E	388,040	77,607	20%
SCE	209,538	48,270	23%
SDG&E	94,664	38,717	41%
SCG	500,838	149,192	30%
Total	1,193,080	313,786	26%

Source: Navigant analysis

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TABLE OF CONTENTS

SECTION 1: Introduction and Overview
SECTION 2: Overview of model methodology
SECTION 3: Review of literature and research
SECTION 4: 2018 Inputs and Preliminary results
SECTION 5: Next Steps and Closing

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SECTION 4: 2018 INPUTS AND PRELIMINARY RESULTS

Household Treatment Forecasts

- 2018 PG is first model to include separate forecasts of SF and MF potential
- For the period 2017 through 2020
  - 71% increase from 2015 PG in forecast HH treated
  - Retreatments account for 39% of all HH treated
  - MF first time and retreatments account for 26% of HH treatment forecast
- Only SCG forecast retreatments to 2030. All other IOU end forecast at 2020

Year	Total 2015 HH	Total 2018 HH	% Increase in HH Treated	% Retreat HH	% MF HH
2017	227,316	274,455	21%	30%	26%
2018	162,316	288,037	77%	37%	26%
2019	155,816	302,287	94%	39%	26%
2020	150,876	328,301	118%	48%	27%
Total	696,324	1,193,080	71%	39%	26%

Source: Navigant analysis

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SECTION 4: 2018 INPUTS AND PRELIMINARY RESULTS

UES Values

- Utilities provided different levels of UES and HH granularity (see slide 10)
- PG&E, SCE, and SDG&E have UES values that vary by year
- UES values averaged across all home types, treatment types and years are presented below to be able to compare to the 2015 PG model

Utility	2015 Model		2018 Model		% Change	
	kWh	Therms	kWh	Therms	kWh	Therms
PG&E	349	15.4	278	20.6	-20%	34%
SCE	378	0.0	443	0.0	17%	
SDG&E	333	17.4	249	14.7	-25%	-15%
SCG	0	27.2	0	29.0		7%

Source: Navigant analysis

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SECTION 4: 2018 INPUTS AND PRELIMINARY RESULTS

UES Values

- 2018 PG UES values by treatment type

Utility	Electricity					Natural Gas			
	First Time		Retreatment		kW / kWh Ratio	First Time		Retreatment	
	SF	MF	SF	MF		SF	MF	SF	MF
PG&E	364	230	292	184	0.0001669	28.1	13.6	22.5	10.9
SCE	481	314	481	314	0.0001656				
SDG&E	274	219	268	215	0.0001523	18.4	9.8	18.0	9.6
SCG						33.2	14.8	31.4	13.6

Source: Navigant analysis

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SECTION 4: 2018 INPUTS AND PRELIMINARY RESULTS

2018 PG LI forecast for electricity (kWh) and natural gas (therms)

Electricity (kWh)				
Year	**2017**	**2018**	**2019**	**2020**
PG&E	26,407,015	26,547,618	27,565,110	27,489,895
SCE	23,615,484	23,575,016	22,749,715	22,813,883
SDG&E	5,239,714	5,239,919	5,239,693	7,816,155
Total	***55,262,212***	***55,362,553***	***55,554,518***	***58,119,933***

Source: Navigant analysis

Natural Gas (Therms)				
Year	**2017**	**2018**	**2019**	**2020**
PG&E	1,951,867	1,962,259	2,037,467	2,031,908
SDG&E	310,274	310,320	310,449	462,933
SCG	3,381,499	3,546,422	3,719,438	3,901,156
Total	***5,643,639***	***5,819,002***	***6,067,355***	***6,395,997***

Source: Navigant analysis

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SECTION 4: 2018 INPUTS AND PRELIMINARY RESULTS

SF/ MF forecast breakout for electricity (kWh) and natural gas (therms)

Single Family (SF) Electricity (kWh)				
Year	**2017**	**2018**	**2019**	**2020**
PG&E	22,519,463	22,639,368	23,507,068	23,442,926
SCE	19,718,232	19,682,787	19,057,962	19,144,788
SDG&E	3,369,513	3,369,635	3,369,459	5,026,428
Total	***45,607,209***	***45,691,789***	***45,934,488***	***47,614,142***

Multifamily (MF) Electricity (kWh)				
Year	**2017**	**2018**	**2019**	**2020**
PG&E	3,887,551	3,908,250	4,058,042	4,046,969
SCE	3,897,252	3,892,229	3,691,753	3,669,095
SDG&E	1,870,200	1,870,284	1,870,235	2,789,727
Total	***9,655,003***	***9,670,763***	***9,620,030***	***10,505,791***

Single Family (SF) Natural Gas (Therms)				
Year	**2017**	**2018**	**2019**	**2020**
PG&E	1,720,875	1,730,038	1,796,345	1,791,444
SDG&E	226,797	226,834	226,906	338,382
SCG	2,885,018	3,025,716	3,173,333	3,328,362
Total	***4,832,691***	***4,982,588***	***5,196,584***	***5,458,188***

Multifamily (MF) Natural Gas (Therms)				
Year	**2017**	**2018**	**2019**	**2020**
PG&E	230,991	232,221	241,122	240,464
SDG&E	83,476	83,487	83,543	124,551
SCG	496,480	520,706	546,106	572,794
Total	***810,948***	***836,414***	***870,771***	***937,809***

Source: Navigant analysis

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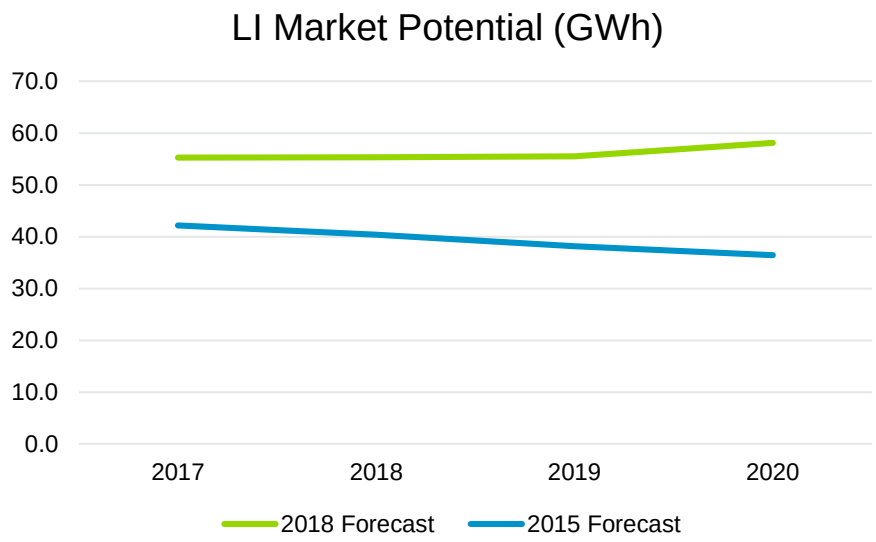
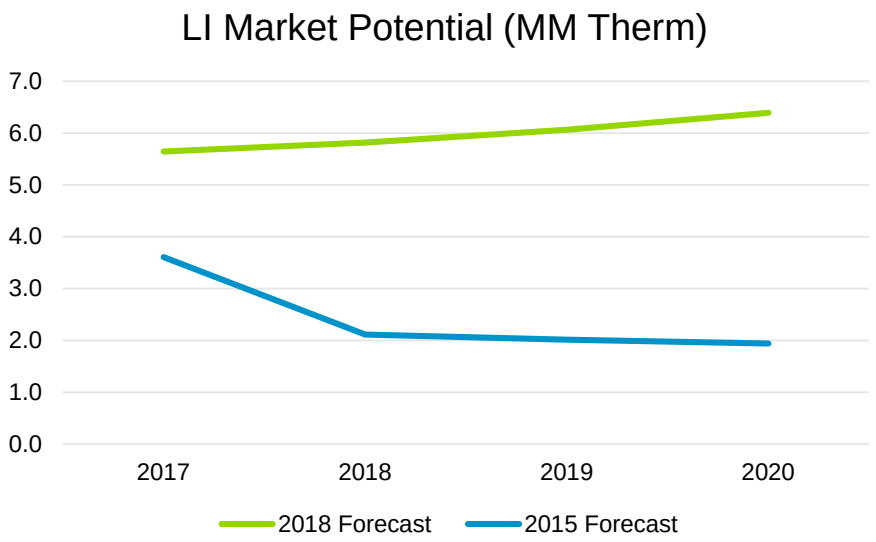
SECTION 4: 2018 INPUTS AND PRELIMINARY RESULTS

Comparison of 2015 and 2018 LI incremental annual market potential forecast for electricity (GWh) and natural gas (MM Therms)





Forecast	2017	2018	2019	2020
2018 Forecast	55.3	55.4	55.6	58.1
2015 Forecast	42.2	40.4	38.2	36.4
Total Natural Gas (MM Therm)				
Forecast	**2017**	**2018**	**2019**	**2020**
2018 Forecast	5.6	5.8	6.1	6.4
2015 Forecast	3.6	2.1	2.0	1.9

Source: Navigant analysis

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TABLE OF CONTENTS

SECTION 1: Introduction and Overview
SECTION 2: Overview of model methodology
SECTION 3: Review of literature and research
SECTION 4: 2018 Inputs and Preliminary results
SECTION 5: Next Steps and Closing

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SECTION 5: NEXT STEPS AND CLOSING

- Review stakeholders comments within current scope and adjust forecast where possible
- Possible future scope:
  - Enhance HH treatment forecast
    - Increase rigor of HH forecast in the MF segment
    - Review impact of high population growth rates in select LI areas defined by SB 535
    - Extend all IOU retreatment forecasts past 2020
  - Enhance UES values
    - Review UES values such as HVAC savings in high population growth in hot climate zones
    - Update saturation estimates of evaporative coolers in SF segment
    - Consider additional measures referenced other research
    - Additional analysis of new measures provided in D 16.11.022
    - Standardize IOU UES data such that all UES estimate include:
      - UES variance by year
      - UES by treatment type
  - Scenarios designed to interpret the impact of other research or initiatives, such as the SB 350 LI EE/DG barriers study

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INFORMAL WRITTEN COMMENTS

- CPUC staff welcome additional informal, written comments.
- Due date: May 10, 2016
- E-mail to **all three**:
  - Paula Gruendling paula.gruendling@cpuc.ca.gov
  - Amul Sathe amul.sathe@navigant.com
  - Chris Ann Dickerson cadickerson@cadconsulting.biz

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SUPPLEMENTAL SLIDES

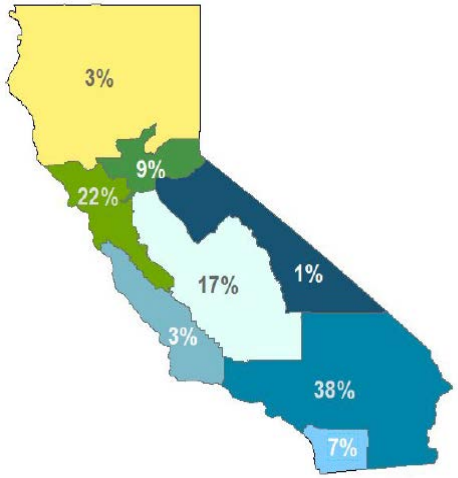
LI market growth trends by geography and climate zone

- Central Valley has significant LI population (Map 1[1]) will have high population growth rates (Map 2[2]) in hot climate zones (Map 3[3]).
  - Impact: UES values are not CZ specific and may not capture growth in potential for HVAC and weatherization improvements in hot climate zones.

Map1

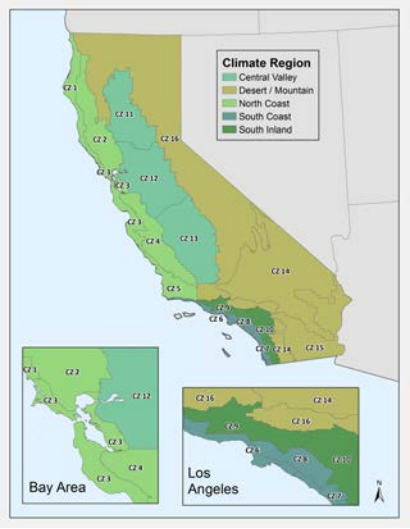
[1]Source: SB 535 CalEPA

Map 2



[2]Source: California's Housing Future: Challenges and Opportunities Public Draft. January 2017 Draft

Map 3



[3]Source: 2016 LINA

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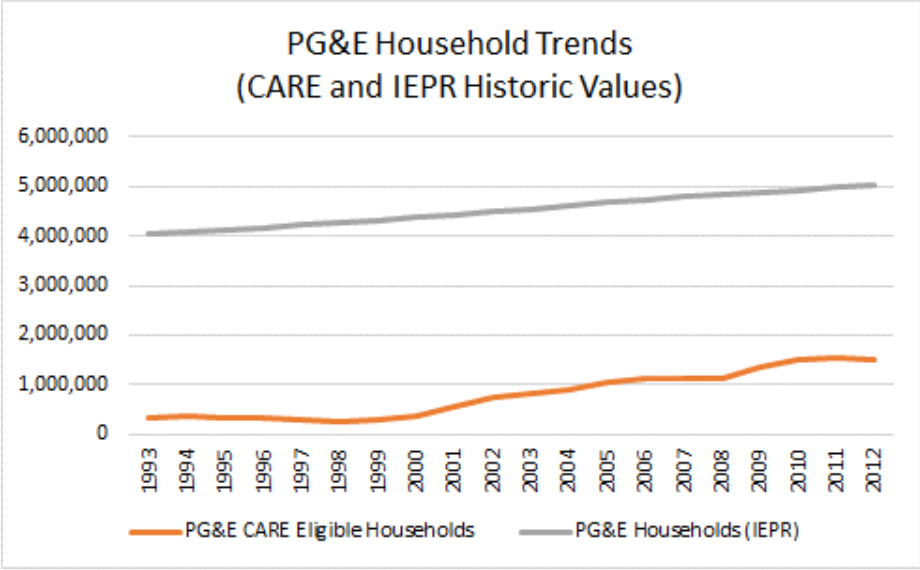
SUPPLEMENTAL SLIDES

Comparison of CARE and IEPR trends

- CARE market growth trends from 2013 LINA report and 2016 IEPR indicate growing LI market.
- Example - Rate of growth of CARE eligible population in PG&E growing faster than growth rate of overall households



Source: Navigant analysis

	CAGR		
Timeframe	Growth Number of PG&E CARE Households (2013 LINA)	Growth in Number of PG&E Households (2016 IEPR)	Ratio (CARE CAGR / PG&E Household CAGR)
1993 - 2012	8.29%	1.15%	7.2
2002 - 2012	7.39%	1.18%	6.3
2007 - 2012	6.00%	1.00%	6.0

Source: Navigant analysis of referenced sources

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SUPPLEMENTAL SLIDES

- Initial assessment of impact of new measures allowed in D 16.11.022

Type/End Use	Measure	Notes	UES Impact
Lighting	LED A-lamps	LEDs have similar efficacy as CFL. Lighting is currently 32% of 2016 ESA savings	Low
	LED Reflector downlights		
	Led reflector downlight retrofit kits		
	LED diffuse A-type lights		
AC	Electronic fan control for CAC	Limited installs based on guidance in the decision	Low
	Central AC in additional climate zones	PGE only, planning 12-18 units per year	Low
Fridges	Replace refrigerators 15 years or older	Already a big saver, currently makes up 38% of SCE 2016 ESA reported savings.	Moderate
	Replace 2nd refrigerators	Application limited by various conditions stated in the decision that limit replacement of 2nd refrigerators	Low
Energy/Water	Thermostat-controlled shower valve	Some gas savings	Low
	Combined showerhead/ thermostatic shower valve		
	Tub diverter		
	Thermostatic tub spout		
Clothes Washers	High efficiency clothes washers	New for PGE. Makes up 0.1% of SCE and 2.3% of SCG 2016 ESA electric and gas savings, respectively	Low
Hot Water	Heat Pump Water Heater	New to SDG&E, gas savings, some increase electricity use through pumping	Low
	High efficiency forced air unit furnace	Gas only, decision indicated SCG will install 3000 furnaces in 2017 saving 24 therm/furnace (103,000 therms)	Moderate
Other	Tier II Power Strips	Currently in portfolio as 'Power Strips' for SCE and SDGE. Account for 1.8% of their portfolio	Low

Source: Navigant preliminary review of D 16.11.022 decision text

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